



# Severity grading of the Leicester Cough Questionnaire in chronic cough

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## To the Editor:

Chronic cough can cause a considerable impairment in the cough-related quality of life (QoL) [1]. Its severity is associated with subjects' willingness to seek medical attention [2, 3]. The Leicester Cough Questionnaire (LCQ) is a validated measure of QoL [1]. It is incorporated extensively in research but less utilised in everyday clinical work. The clinical use of any measure necessitates the definition of a reference range for values considered as normal and a valid grading of severity for abnormal values.

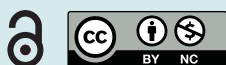
Recently, REYNOLDS *et al.* [4] presented the reference values for the LCQ total score (LCQ-TS) in a sample of 143 healthy subjects. RHATIGAN *et al.* [5] presented a grading of LCQ-TS among patients with chronic cough from a tertiary care specialist cough clinic. In the present study, we present severity grading of LCQ scores in a large community-based population consisting of subjects with a wide age range who suffered of chronic cough (duration  $\geq 2$  months [6]). To validate the grading, we assessed the association of the LCQ scores with the presence of multiple self-reported doctor's visits due to cough (MV), defined arbitrarily as three or more within the last 12 months [2]. This is a meaningful basis for grading: from the subject's point of view, it indicates a strong need for medical help. From the viewpoint of the society, it expresses the burden of cough on healthcare resources.

The population was gathered from two cross-sectional e-mail-based surveys. The first was conducted in 2017 among public service employees of two towns in central Finland and the second one in 2021 among the members of the Finnish Pensioners' Federation. Both were approved by the Ethics Committee of Kuopio University Hospital (289/2015). The details of the surveys and the subjects' comorbidities have been described earlier [7, 8].

There were 1264 subjects with current chronic cough. Of them, 1248 subjects reported the doctor's visits. Their mean $\pm$ SD age was 65.1 $\pm$ 12.8 years with a range of 20–90 years with 72.9% females. The subjects' mean LCQ-TS was 14.75 $\pm$ 3.06 points. LCQ-TS was neither associated with age (Pearson correlation coefficient 0.00,  $p=0.99$ ) nor gender (female 14.72 $\pm$ 3.10, male 14.81 $\pm$ 2.94) ( $p=0.66$ , independent samples  $t$ -test). 159 (12.7%) subjects reported MV.

MV was strongly associated with low LCQ-TS (yes: 12.06 $\pm$ 3.13; no: 15.14 $\pm$ 2.84 points ( $p<0.001$ )). To further explore this association, the LCQ-TS values were divided to percentiles (figure 1). It was shown that the association was nonlinear. In the 10th and 20th percentiles, indicating the lowest LCQ-TS, 32.3–36.8% of the subjects reported MV. The corresponding proportion was 4.1–13.5% in the 30–80th percentiles and 1.6% in the 90–100th percentiles. We propose that the first group suffers from severe, the second group moderate and the third group mild impairment in the QoL. The corresponding LCQ-TS limits were 3.00–12.28, 12.29–17.53 and 17.54–21.00 points.

In addition, in the three LCQ domains, there were nonlinear associations between low scores and MV (data not shown). The corresponding limits were 1–4.25, 4.26–5.75 and 5.76–7.00 points for the physical domain; 1–3.57, 3.58–5.71 and 5.72–7.00 points for the psychological domain; and 1–4.25, 4.26–6.25 and 6.26–7.00 for the social domain. Neither age nor gender associated with any of the domains (data not shown,  $p>0.05$ ).

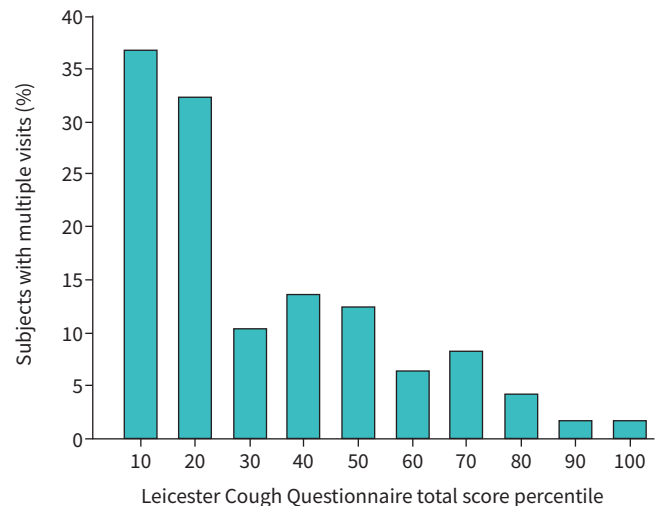


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Leicester Cough Questionnaire total scores were graded to severe (3.00–12.28), moderate (12.29–17.53) and mild (17.54–21.00), based on the prevalence of multiple self-reported doctor's visits due to cough among 1248 subjects with current cough <https://bit.ly/3UkCe4i>

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**FIGURE 1** The proportion of subjects with chronic cough reporting multiple (three or more) self-reported doctor's visits due to cough during the preceding 12 months in Leicester Cough Questionnaire total score percentiles. The 10–20th percentiles represent Leicester Cough Questionnaire total scores 3.00–12.28; the 30–80th percentiles, scores 12.29–17.53; and the 90–100th percentiles, scores 17.54–21.00.

In the present large, community-based sample, neither age nor gender affected the LCQ scores, suggesting that the same grading can be used in all adult age groups and in both genders. Accordingly, age was not associated with LCQ scores in the healthy subjects investigated by REYNOLDS *et al.* [4]. However, they could not assess the effect of gender due to the small number of males in their sample. The association of gender with the cough-specific QoL has been inconsistent in the previous studies investigating patients referred to specialist cough clinics [9, 10]. In a large community-based sample from Denmark, there were no differences between the genders in the LCQ-TS, psychological domain and social domain but a slight difference in the physical domain [11].

All subjects with chronic cough should be examined according to the current cough guidelines, irrespective of the LCG-TS [6]. Our severity grading may be useful when managing patients without abnormal thoracic radiographic findings, “red flag” signs or obvious causes of chronic cough.

Our “mild” group (LCQ-TS 17.54–21.00) overlaps the normal range for the LCQ-TS previously presented by REYNOLDS *et al.* [4] (17.68–21.00). As they speculated, some degree of coughing is normal even among individuals who consider themselves healthy. It is probably up to individual differences in how intensively people experience various body sensations whether such coughing is considered as a disorder [12]. Very probably, subjects with “mild” chronic cough do not visit secondary or tertiary outpatient respiratory clinics but may sometimes visit primary healthcare. The present reference values may help primary care doctors to manage such patients and suggest that further respiratory examinations may not be indicated.

The “moderate” group (LCQ-TS 12.29–17.53) included the majority (60%) of the sample and this group can probably be managed in the primary healthcare. The “severe” group (LCQ-TS 3.00–12.28) represents those who typically visit tertiary respiratory centers [5, 13, 14]. For a less experienced physician, a LCQ-TS  $\leq 12.28$  signals a need for a prompt and comprehensive examination and, if necessary, a referral to a specialist cough clinic. Due to the documented high risk for MV among such patients, they probably deserve the most effective medical treatment, even accepting some side-effects [15], in addition to efficient lifestyle modifications.

In the study by RHATIGAN *et al.* [5], severe chronic cough was defined as LCQ-TS  $< 10$ , moderate as 10–13 and mild as  $> 13$ . These are much lower values than in our study. Of note, all their patients had visited a tertiary care specialist cough clinic and thus, probably represent a subgroup of patients with severe or refractory chronic cough. Conversely, our population was a community-based sample including all subjects with chronic cough, even those who had never visited a doctor due to their disorder. We believe that our population better represents all patients with chronic cough. Furthermore, in the study by RHATIGAN *et al.* [5], cough severity was subjectively assessed by the patients as an answer to a single question. In our study, the severity was assessed by the presence of MV.

Our severity grading may also be useful in selecting patients for cough drug trials and the “mild” zone may be a realistic goal for the treatments. Furthermore, the severity grading may help to estimate the burden of chronic cough on healthcare resources.

The main limitation of the present study is that the grading was solely based on self-reported doctor’s visits. Some of them may have been scheduled, not due to current need for medical help. In future, the grading should be validated by more objective measures like cough counting. Furthermore, between-country differences in the accessibility of doctors may decrease the generalisability of the present results. Finally, the COVID-19 pandemic may have affected the number of doctor’s visits in the year 2021 study population.

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